

ONTARIO MINISTRY OF ENVIRONMENT



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OPERATING SUMMARY

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TOWN OF

HAILEYBURY

WATER TREATMENT PLANT and
WATER POLLUTION CONTROL PLANT

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Haileybury : water treatment
plant and water pollution control
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HAILEYBURY

WATER TREATMENT PLANT

and

WATER POLLUTION CONTROL PLANT

MINISTRY OF THE ENVIRONMENT

1974 ANNUAL OPERATING SUMMARY

prepared by

Plant Performance Unit

TECHNICAL SERVICES BRANCH

T. Cross, Director



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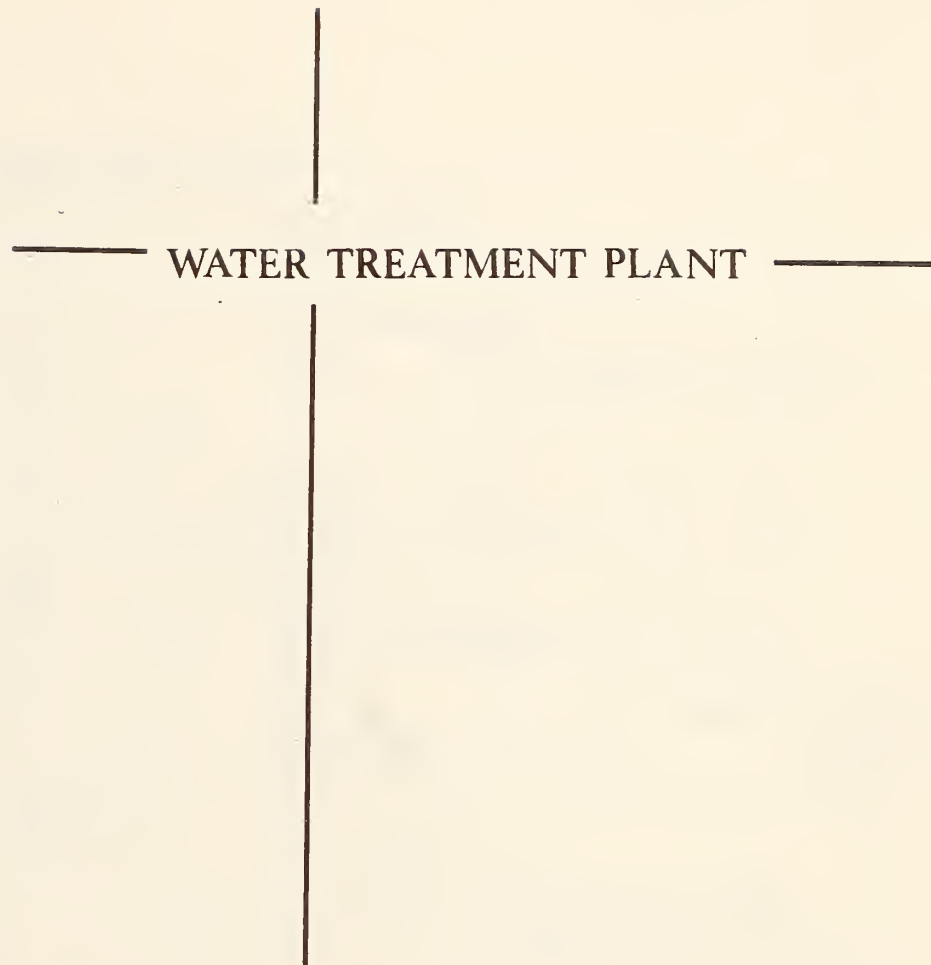
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WATER TREATMENT PLANT

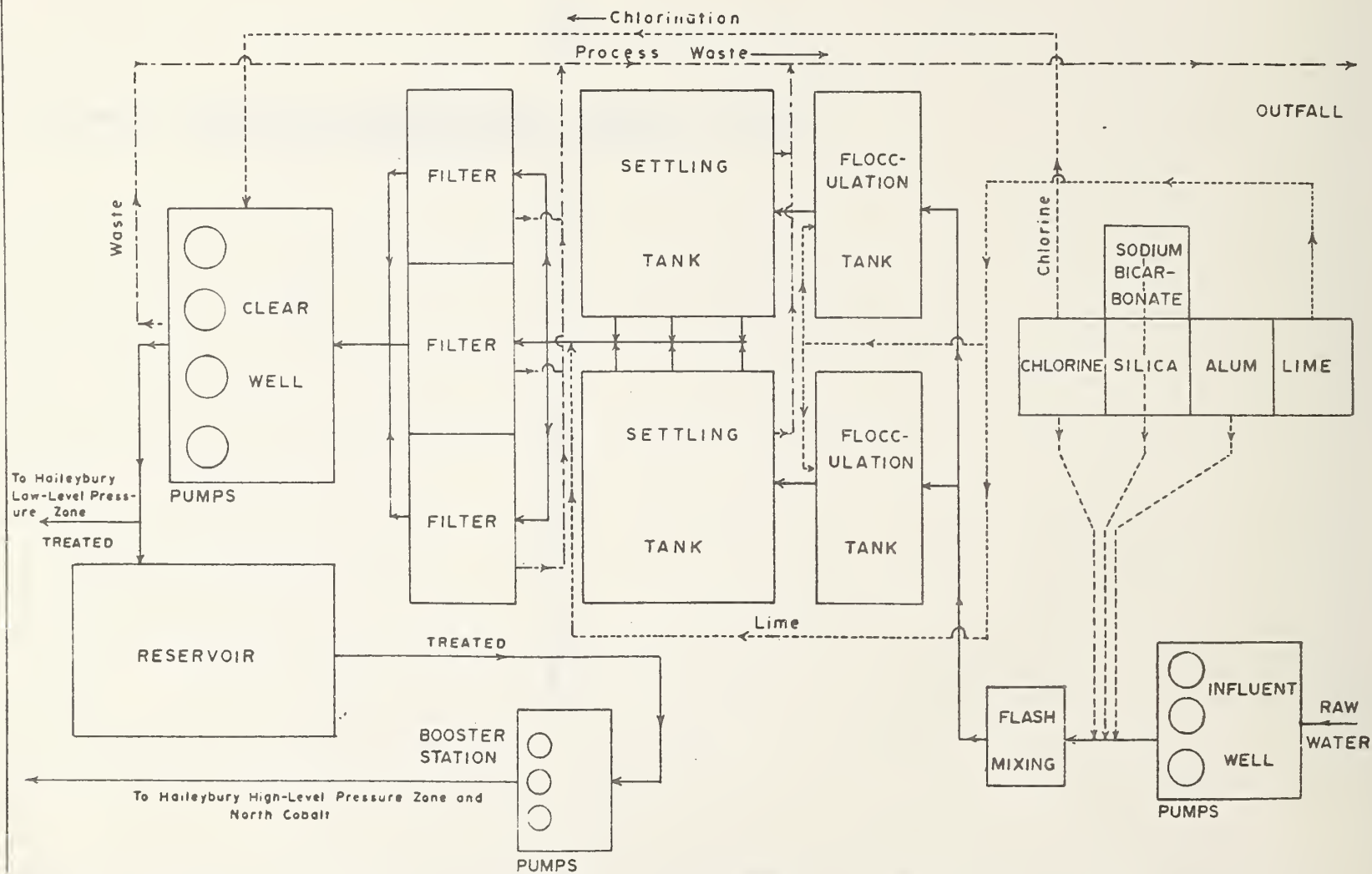
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WATER POLLUTION CONTROL PLANT

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TOWN OF HAILEYBURY WATER TREATMENT PLANT



DESIGN DATA

PROJECT	Town of Haileybury WPCP
NOMINAL CAPACITY	1.5 MIGD
RAW WATER SOURCE	Lake Timiskaming

INTAKE

910' of 18" dia plastic gravity intake
Design flow 5 MGD

LOW LIFT PUMPING

- 3 submersible pumps
Capacity: 600 GPM ea.

WATER TREATMENT PLANT

FLASH MIXING

Capacity 520 gal

FLOCCULATION TANKS

Size: 15' x 24.5' x 9' (21,000 gal)
Detention: 40 minutes

SETTLING TANKS

Size: 55' x 23'-4" x 9' (154,000 gal. tot.)
Overflow rate: 550 gpd/sq. ft.

FILTERS

Type: Gravity Anthracite & Sand
Size: Three 10' x 14'
Filter rate: 2.4 gpm/sq. ft.

CLEAR WELL

Capacity: 55,000 gal.

HIGH LIFT PUMPING

Type: PLEUGER Deep Well Submersible
Capacity: Three 580 IGPM @ 230' TDH
(2.4 MIGD total)

BACKWASH PUMP

Type: PLEUGER
Capacity: 2600 gpm @ 26' TDH

STANDBY POWER

60 cps 3-phase STAMFORD alternator
with 6 cyl. DORMAN diesel

STORAGE

Reservoir 0.4 MG
Old Reservoir: 0.2 M. G.

BOOSTER STATION

Pump Type CRANE vertical turbine
Capacity: Two 700 gpm
One 1350 gpm
Standby power: BEDFORD horizontal Diesel
to #3 pump (1350 gpm)

'74 Review

GENERAL

The Haileybury water treatment plant is a 1.5 million gallon per day complete treatment plant and is designed to provide for an ultimate treatment capacity of 3.0 million gallons per day.

The plant provides complete treatment to the water of Lake Timiskaming which in the untreated state is highly coloured, turbid and aggressive. The treatment process is designed to reduce the aggressive nature of the water and to bring colour, iron and turbidity levels to within the Ministry's water quality standards. Disinfection of the filtered water is effected by gas chlorination.

The treated water is pumped directly to a 600,000 gallon capacity ground storage reservoir. Water is fed by gravity from this reservoir to the lower sections of the Town of Haileybury. Booster pumps located at the reservoir continuously supply water to areas of the Town located at higher elevations.

The plant is staffed by a superintendent, a maintenance mechanic, two operators and a casual part-time operator who divide their duties between the Haileybury water and sewage projects.

The main difficulties experienced in the plant in 1974 were in process control. As a result there are a number of changes in the processes scheduled to be put into effect in 1975.

OPERATING COSTS

The total operating costs for the project in 1974 were \$82,479, indicating a cost of \$503 per million gallons of water treated. The largest expenditure for the project was for salaries at \$35,785.

PLANT FLOWS

The total plant output for 1974 was 106.1 million gallons. The maximum daily flow occurred in August and was 0.65 million gallons. The average daily flow of 0.45 million gallons represents 30% of the plant design capacity of 1.5 million gallons per day. The per capita water consumption based on an estimated serviced population of 3892 was 116 IGPD. There was approximately a 10% increase in the water consumption over 1973.

PROCESS CHEMICALS

A total of 8,302 gallons of liquid alum were used as coagulant during 1974. The average dosage was 44.5 mg/l with a monthly average dosage range from 21.9 mg/l to 65.5 mg/l.

A total of 365 gallons of sodium silicate at an average dosage of 3.1 mg/l and a total of 3,225 pounds of sodium bicarbonate at an average dosage of 0.8 mg/l were used as flocculation aids.

A total of 20,000 pounds of lime at an average dosage of 12.2 mg/l was added to the clear well to maintain the pH between 8.0 and 8.5.

A total of 3,527 pounds of chlorine was used for disinfection during 1974. An average dosage of 2.1 mg/l was used to maintain a residual of 0.7 mg/l for the required 15 minute contact period.

PHYSICAL WATER QUALITY

The Lake Timiskaming water can be considered very soft with an average of 29 mg/l hardness as CaCO_3 . The treated water averaged 42 mg/l hardness as CaCO_3 which is also in the "soft" range.

The raw water iron content averaged 2.5 mg/l while the treated water averaged 0.30 mg/l which is the Ministry of the Environment maximum recommended limit for iron in a potable water supply.

The average colour and turbidity concentrations of 6 units and 2.7 FTU respectively do not meet recommended Ministry standards. The plant has not been able to attain less than 1 FTU and less than 5 colour units in the treated water due to the difficulties experienced in treating a very low alkalinity water. For this reason, it is planned to introduce alkalinity into the raw water in 1975 by the addition of soda ash and to experiment with a polyelectrolyte in place of activated silica to determine if a better quality water can be produced.

BACTERIOLOGICAL QUALITY

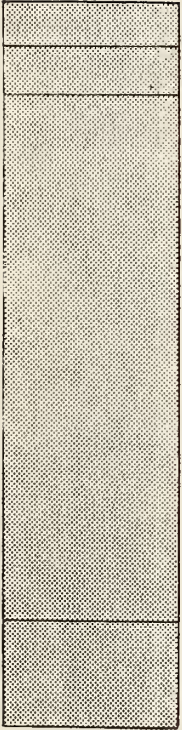
Twenty-eight treated water samples were collected at the plant and twenty-five from the distribution system in 1974. All were found to be coliform free.

CONCLUSIONS

The bacteriological quality of the treated water in 1974 was good. It is hoped that the refinements in the process in 1975 will produce a better quality water with respect to colour and turbidity levels.

ANNUAL COSTS

1974 OPERATING COSTS

- 
- SALARIES & WAGES
 - EMPLOYEE BENEFITS
 - TRANSPORTATION & COMMUNICATIONS 6 %
 - SERVICES 7 %
 - SUPPLIES & EQUIPMENT 72 %
 - AQUISITION/CONSTRUCTION OF PHYSICAL ASSETS
 - TRANSFER PAYMENTS
 - OTHER TRANSACTIONS 15 %

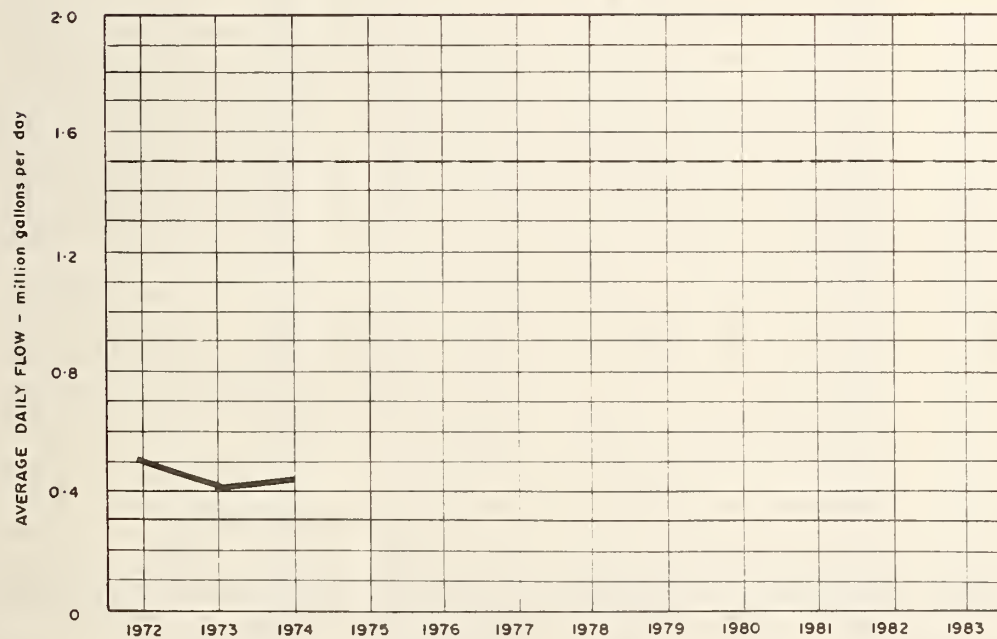
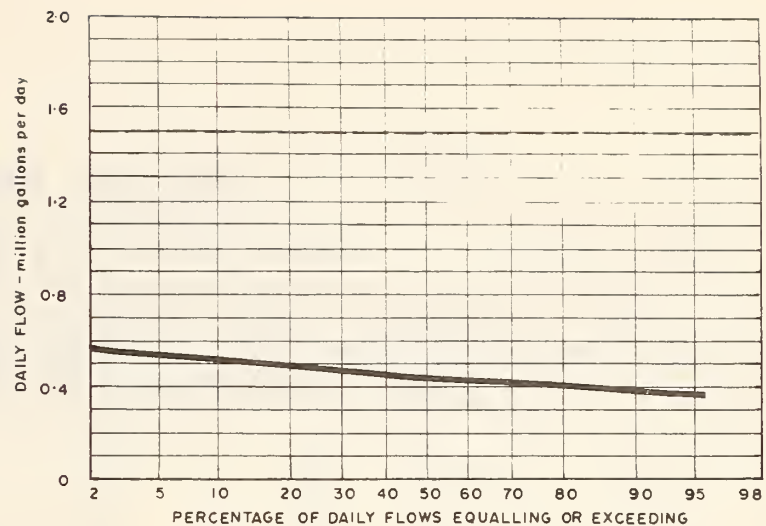
YEARLY OPERATING COSTS

YEAR	WATER TREATED in million gallons	TOTAL OPERATING COSTS	UNIT COSTS
			cents /1000 gal.
1974	164	82,479	50

OPERATING EXPENDITURES

Regular Staff	\$ 31,180	\$
Casual (Unclassified) Staff	<u>4,605</u>	
TOTAL SALARIES AND WAGES		<u>35,785</u>
TOTAL EMPLOYEE BENEFITS		<u>5,600</u>
TOTAL TRANSPORTATION AND COMMUNICATIONS		<u>2,350</u>
Insurance	<u>1,064</u>	
Sludge Haulage	<u>-</u>	
Repairs and Maintenance	<u>1,612</u>	
Other Services	<u>403</u>	
TOTAL SERVICES		<u>3,079</u>
Machinery and Equipment	<u>4,384</u>	
Chemicals	<u>5,558</u>	
Utilities	<u>14,332</u>	
Other Supplies and Equipment	<u>5,198</u>	
TOTAL SUPPLIES AND EQUIPMENT		<u>29,472</u>
TOTAL AQUISITION/CONSTRUCTION OF PHYSICAL ASSETS		<u> </u>
TOTAL TRANSFER PAYMENTS		<u> </u>
OTHER TRANSACTIONS		<u>6,193</u>
GRAND TOTAL	GRAND TOTAL	\$ <u>82,479</u>

PROCESS DATA FLOWS



DESIGN CAPACITY - - - - -

PLANT PERFORMANCE

MONTH	FLOWS				RAW WATER		TREATED WATER					
	TOTAL PLANT OUTPUT million gallons	AVERAGE DAILY FLOW million gallons	MAXIMUM DAY'S FLOW million gallons	MAXIMUM RATE mgd	TURBIDITY (AVERAGE) FTU	COLOUR (AVERAGE) App. units	TURBIDITY		COLOUR		TEMPERATURE	
							AVERAGE FTU	MAXIMUM FTU	AVERAGE App. units	MAXIMUM App. units	AVERAGE ° F	MAXIMUM ° F
JAN	13.26	.428	.539		4.8	58	1.8	1.8	<5	5	33	34
FEB	12.39	.443	.521		3.5	45	3.3	4.8	<5	5	34	34
MAR	14.03	.453	.609		5.1	68	2.8	3.2	<5	15	34	35
APR	12.86	.428	.470		4.2	68	3.9	2.3	7	15	34	35
MAY	13.56	.438	.514		25.5	73	4.0	4.8	6	20	39	46
JUNE	12.45	.415	.609		26.0	73	1.7	2.4	7	15	55	60
JULY	13.09	.422	.524		30.0	74	2.3	2.3	6	20	62	64
AUG	14.45	.466	.647		9.3	68	1.3	1.7	<5	5	68	71
SEPT	15.04	.501	.549		9.6	73	1.0	1.1	6	10	63	69
OCT	16.39	.529	.646		23.0	72	2.2	2.2	5	14		
NOV	13.01	.433	.470		23.0	69	4.3	4.7	5	15		
DEC	13.60	.439	.490			70			5	5		
TOTAL	164.13											
AVG.		.450	MAXIMUM .646	MAXIMUM	14.7	70	2.7	MAXIMUM 4.8	6	MAXIMUM 20	47	MAXIMUM 71

CHLORINATION and DISINFECTION

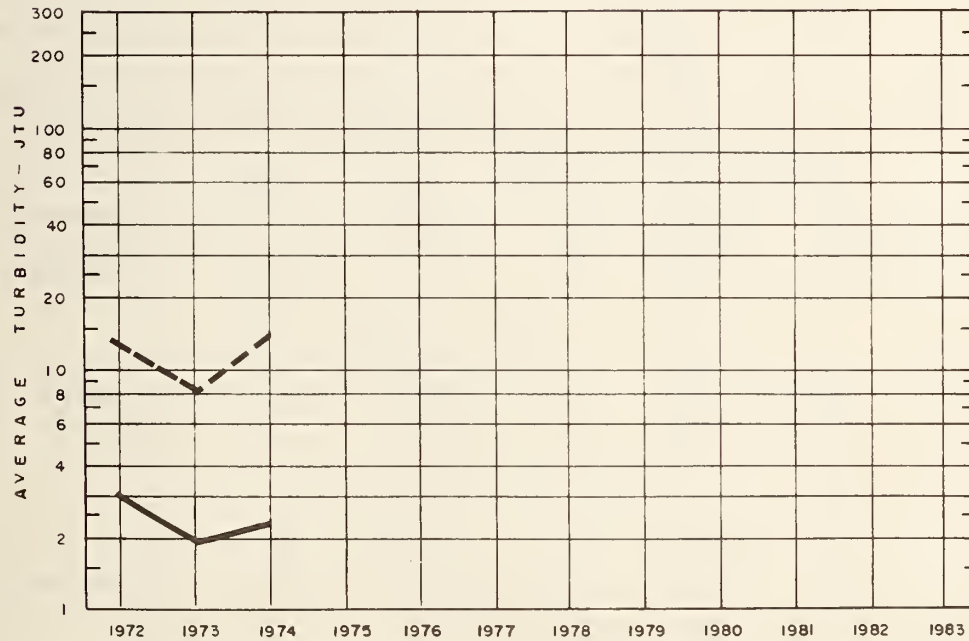
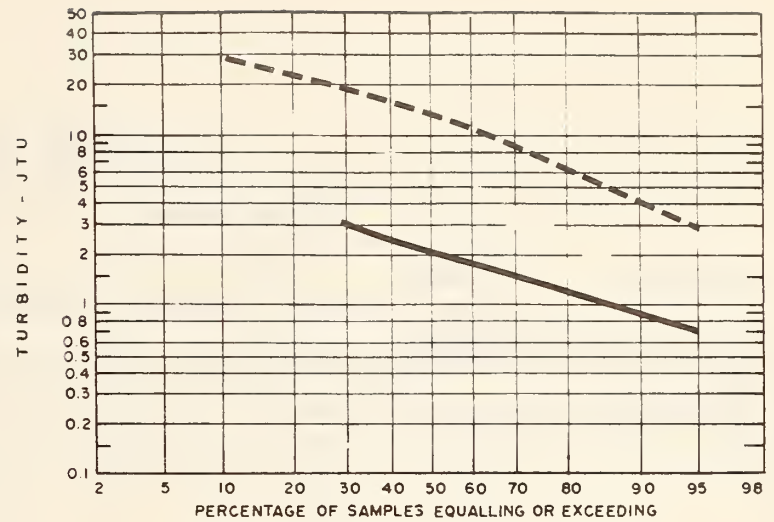
MONTH	RAW WATER					PLANT EFFLUENT		DISTRIBUTION SYSTEM		CHLORINATION			
	NUMBER OF SAMPLES HAVING TOTAL COLIFORM ORGANISMS PER 100 ml OF					NUMBER OF SAMPLES TAKEN	NUMBER HAVING COLIFORM ORGANISMS	NUMBER OF SAMPLES TAKEN	NUMBER HAVING COLIFORM ORGANISMS	TOTAL AMOUNT OF CHLORINE USED pounds	DOSAGE		RESIDUAL IN PLANT EFFLUENT mg/l
	0	1 - 3	4 - 32	33-320	> 320						PRE - mg/l	POST - mg/l	
JAN			1			2		2		320		2.4	.6
FEB	2					2		2		330		2.7	.5
MAR	1		1			2		2		296		2.1	.5
APR				1		1		1		276		2.1	.7
MAY				2		2		2		405		3.0	1.4
JUNE			2			2		2		420		3.3	1.5
JULY		1	1			2		2		307		2.3	.7
AUG				2		2		2		267		1.8	.6
SEPT	1		1			2		2		256		1.7	.6
OCT	1		2	1		3		4		243		1.4	.5
NOV				4		4		2		190		1.4	.5
DEC			3	1		4		2		217		1.6	.5
TOTAL	5	1	11	11		28		25		3527			
AVG.	15 (NOTE - Average shown is the GEOMETRIC MEAN)									10 pounds per day		2.1	.7

TREATMENT DATA

MONTH	FILTER OPERATION		CHEMICALS USED					
	AVERAGE RUN hours	BACKWASH WATER million gallons	A L U M		SODIUM SILICATE SOLUTION		L I M E	
			AMT. USED 10 ³ gallons	DOSAGE mg/l	AMT. USED gallons	DOSAGE mg/l	AMT. USED 10 ³ pounds	DOSAGE mg/l
JAN	53	.285	1336	65.5	31	3.3	1550	11.7
FEB	63	.225	489	25.7	28	3.2	2250	18.2
MAR	51	.300	473	21.9	31	3.1	2150	15.3
APR	68	.225	571	28.9	30	3.3	2150	16.7
MAY	73	.210	1333	63.9	31	2.3	2100	15.5
JUNE	81	.180	1200	62.7	30	3.4	1750	14.1
JULY	85	.180	1067	53.0	31	3.3	1950	14.9
AUG	115	.165	1051	47.3	31	2.1	2450	17.0
SEPT	92	.180	782	33.8	30	2.8	1950	13.0
OCT	91	.240	6459*	39.4	31	2.6	736	4.5
NOV	102	.165	5057*	38.4	30	3.2	599	4.6
DEC	86	.210	5151*	38.9	30	3.2	757	5.5
TOTAL		2.565	8302 gal. 16667 lb.*		365		20392	
AVG.	80	.214	922 gal. 5556 lb.*	43.2	30	3.1	1699	12.4

*Indicates pounds of Alum; method of measurement changed.

TURBIDITY



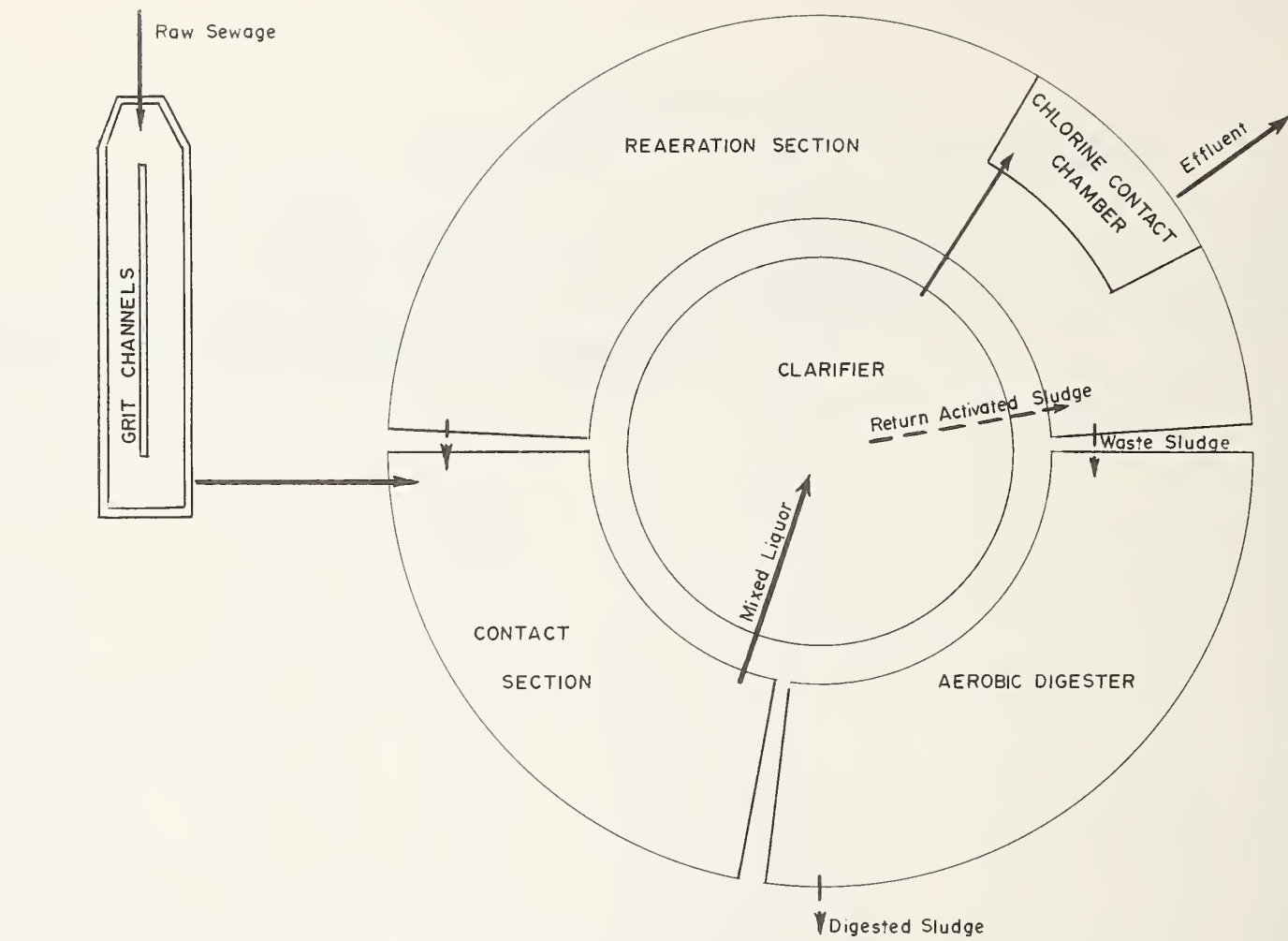
PLANT INFLUENT - - - - -

PLANT EFFLUENT —————

WATER QUALITY

PROPERTY	RAW WATER				TREATED WATER				DESIRABLE STANDARDS
	NUMBER OF SAMPLES	AVERAGE	MAXIMUM	MINIMUM	NUMBER OF SAMPLES	AVERAGE	MAXIMUM	MINIMUM	
HARDNESS in mg/l as CaCO_3	21	29	60	14	21	42	54	26	80 - 100
ALKALINITY in mg/l as CaCO_3	21	16	25	6	21	19	26	3	30 - 100
IRON in mg/l Fe	20	2.5	11.0	.7	20	.3	1.7	<.05	Less than 0.3
CHLORIDE in mg/l Cl^-	21	2	4	1	21	4	5	2	Less than 250
pH in pH units	21	7.7	9.3	6.7	21	8.2	9.3	6.5	7.0 - 8.5
FLUORIDE in mg/l F^-	21	.1	.4	<.1	21	<.1	.3	<.1	Less than 1.2
AMMONIA in mg/l as N									Less than 0.5
TOTAL KJELDAHL NITROGEN in mg/l as N									Less than 1.
NITRITE in mg/l as N					1	<.2	<.2	<.2	
NITRATE in mg/l as N									Less than 10
TOTAL PHOSPHORUS in mg/l as P									
SOLUBLE PHOSPHORUS in mg/l as P									
PHENOLS in $\mu\text{g/l}$ as $\text{C}_6\text{H}_5\text{OH}$									Less than 1
Aluminum as Al	17	.56	1.40	.04	16	.9	1.8	.2	
Conductivity	15	65	98	42	15	111	140	93	

— WATER POLLUTION CONTROL PLANT —



TOWN OF
HAILEYBURY WPCP

DESIGN DATA

PROJECT Town of Haileybury WPCP

PROJECT NO.	1-0069-67	<u>PUMPING STATION</u>	<u>AEROBIC DIGESTER</u>
DESIGN FLOW	0.350 mgd	Two - 625 IGPM @ 61 ft TDH One Diesel engine	Volume: 15,000 ft ³ or 93,400 gal Loading: 4.3 ft ³ /capita
BOD - Raw Sewage	170 mg/l		
- Removal	90%	<u>GRIT REMOVAL</u>	<u>SEDIMENTATION</u>
SS - Raw Sewage	200 mg/l	Type: Manually cleaned channels	Volume: 12,100 ft ³ or 75,500 gal
- Removal	90%	Size: Two	Detention: 5.7 hr @ 350,000 Igpd Loading: Surface weir
		<u>SCREENING</u>	<u>CHLORINE CONTACT CHAMBER</u>
		Bar Screen 1 3/4" openings	Volume: 8600 gal Detention: 35 min @ 0.35 mg
		<u>AERATION</u>	
		Volume: 8,300 ft ³ or 52,400 gal Detention: 3.6 hr @ 0.35 mgd Diffusers: S & L Aluminum	
		<u>REAERATION SECTION</u>	
		Volume: 21,330 ft ³ or 132,900 gal Detention: 7.6 hr @ max. return rate of 417,600 Igpd	

'74 Review

GENERAL

The Haileybury sewage project consists of a 350,000 gallon per day prefabricated contact stabilization treatment plant, and a custom built sewage pumping station. The plant is operated jointly with the Haileybury water treatment plant and the Haileybury South sewage lagoon.

In 1974 the Ministry retained a consulting engineer to prepare a report required for the expansion of the plant to provide additional treatment capacity. Some of the preliminary field work was carried out in 1974 for this report.

OPERATING COSTS

The total operating cost for the project in 1974 was \$26,969 which represents a cost of \$129.53 per million gallons of sewage treated.

PLANT FLOWS AND CHLORINATION

The total sewage flow for 1974 was 208.2 million gallons. The average daily flow of .570 million gallons during 1974 was 163% of the design flow capacity. This represented an increase of approximately 13% over the 1973 average daily flow.

A total of 1,853 pounds of chlorine was required at a dosage of 2.2 milligrams per litre to produce a chlorine residual of 0.5 milligrams per litre in the final effluent. Chlorination was carried out only between the months of May and November.

PLANT EFFICIENCY

The raw sewage BOD and suspended solids concentration were 125 mg/l and 165 mg/l respectively. The total organic loading was 260,250 pounds of BOD and 343,530 pounds of suspended solids. Of these totals, 241,512 pounds of BOD and 310,218 pounds of suspended solids were removed by the treatment process representing a removal efficiency of 92.8% and 90.3% respectively.

The average BOD and suspended solids concentration in the final effluent were 20 mg/l and 16 mg/l respectively. The mixed liquor suspended solids concentration averaged 3,200 mg/l. The F/M ratio averaged 0.10.

SLUDGE DIGESTION AND DISPOSAL

An estimated total of 210,000 gallons of sludge was wasted to the aerobic digester, and a total of 80,000 gallons of treated sludge was hauled from the digester by tank truck. The sludge was then disposed of by spreading on local farm fields. The total solids concentration of the digested sludge was 5.5%.

A total of 958 cubic feet of grit was removed from the plant during the year.

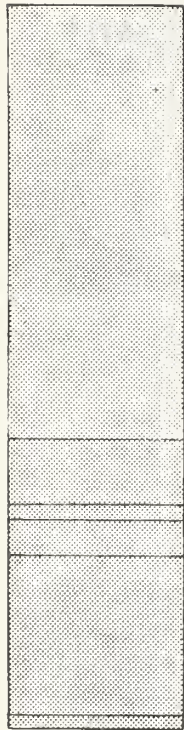
CONCLUSIONS

The plant has continued to produce a good quality effluent during 1974 despite a hydraulic overload of 163% of the plant design capacity.

The expansion of this treatment facility will provide additional capacity to treat anticipated future increases in the sewage flows from the Town of Haileybury.

ANNUAL COSTS

1974 OPERATING COSTS



- SALARIES & WAGES
- EMPLOYEE BENEFITS
- TRANSPORTATION & COMMUNICATIONS
- SERVICES
- SUPPLIES & EQUIPMENT
- ACQUISITION/CONSTRUCTION OF PHYSICAL ASSETS
- TRANSFER PAYMENTS
- OTHER TRANSACTIONS

%

57

9

2

5

23

2

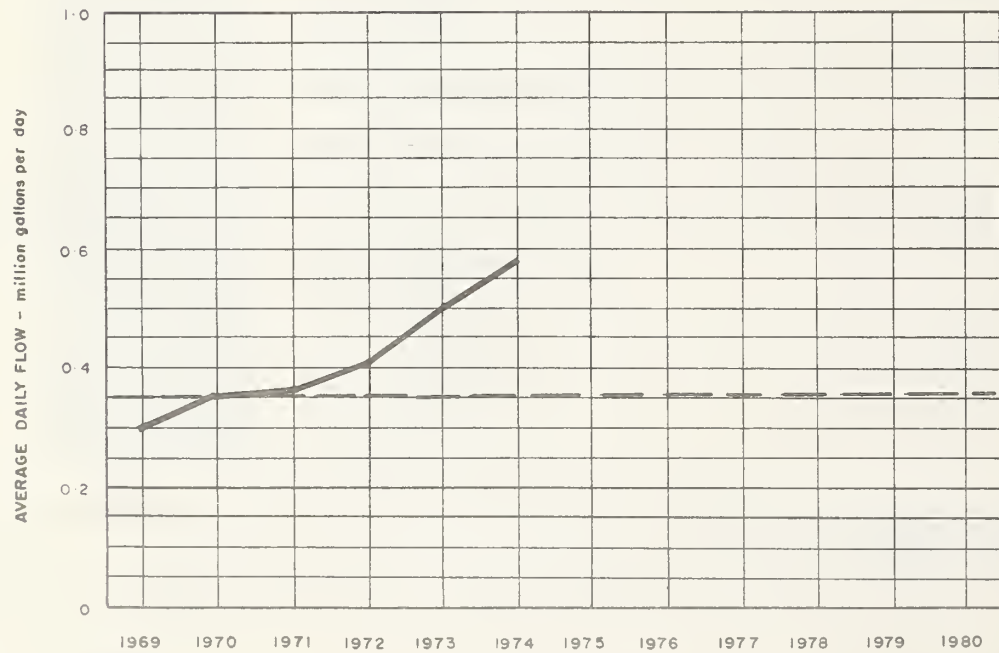
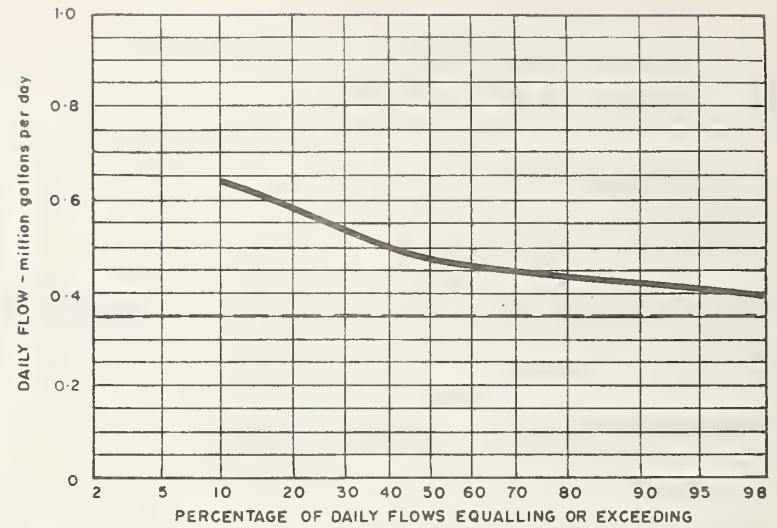
YEARLY OPERATING COSTS

YEAR	SEWAGE TREATED in million gallons	TOTAL OPERATING COSTS	UNIT COSTS	
			\$/M G	¢/lb BOD
1974	208.2	27366	131	11

OPERATING EXPENDITURES

Regular Staff	\$ 13,701	\$
Casual (Unclassified) Staff	2,023	
TOTAL SALARIES AND WAGES		15,724
TOTAL EMPLOYEE BENEFITS		2,461
TOTAL TRANSPORTATION AND COMMUNICATIONS		512
Insurance	394	
Sludge Haulage	896	
Repairs and Maintenance	-	
Other Services	44	
TOTAL SERVICES		1,334
Machinery and Equipment	53	
Chemicals	1,017	
Utilities	5,159	
Other Supplies and Equipment	55	
TOTAL SUPPLIES AND EQUIPMENT		6,284
TOTAL AQUISITION/CONSTRUCTION OF PHYSICAL ASSETS		
TOTAL TRANSFER PAYMENTS		
OTHER TRANSACTIONS		654
GRAND TOTAL	GRAND TOTAL	\$ 27,366

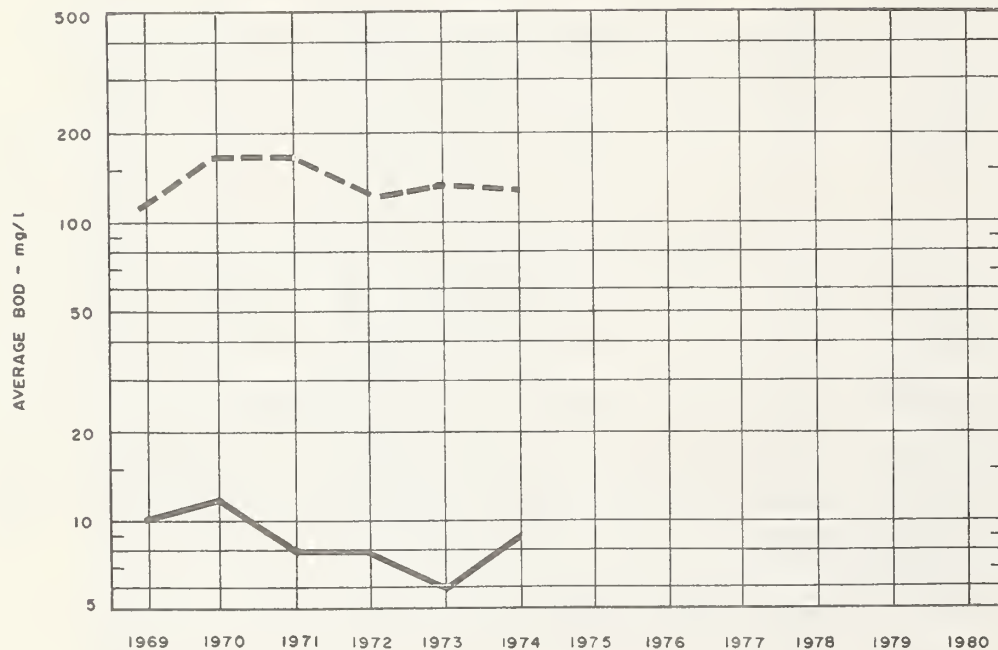
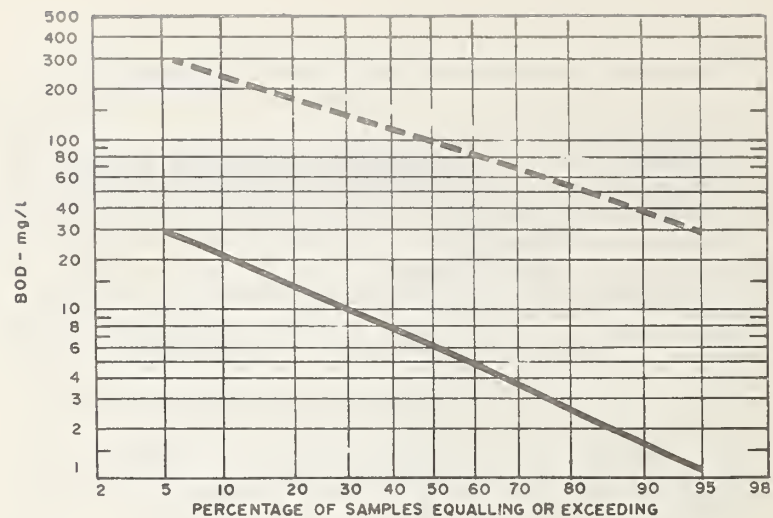
PROCESS DATA FLOWS



PLANT PERFORMANCE

MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10 ³ pounds	mg/l	mg/l	%	10 ³ pounds	mg/l P	mg/l P
JAN	15.5	.50	.54	115	7	94	16.7	178	10	94	26.0	7.3	.4
FEB	14.2	.51	.56	160	11	99	21.2	175	15	91	22.7	8.8	1.9
MAR	17.2	.55	.72	155	6	96	25.6	220	10	95	36.0	7.0	1.5
APR	20.0	.67	.80	48	5	90	8.6	50	15	70	7.0	2.9	.6
MAY	21.0	.68	.79	98	3	97	20.0	133	15	89	24.8	5.9	.9
JUNE	17.9	.60	.78	167	3	98	29.4	133	15	89	21.1	7.3	1.2
JULY	16.9	.55	.79	30	5	83	4.2	90	15	83	12.7	2.8	.8
AUG	14.6	.47	.68	295	8	97	41.9	475	15	97	67.2	11.0	1.3
SEPT	17.2	.57	.80	90	5	94	14.6	178	15	92	28.0	6.2	1.9
OCT	20.1	.65	.78	50	2	96	9.6	110	15	86	19.1	5.0	1.3
NOV	18.3	.61	.77	70	32	54	7.0	130	28	78	18.7	7.3	1.1
DEC	15.3	.49	.80	75	10	87	9.9	130	20	85	16.8	4.7	3.9
TOTAL	208.2	-	-	-	-	-	241.5	-	-	-	310.2	-	-
AVG.		.57	MAXIMUM .80	125	9	93	20.1	165	16	90	25.9	6.8	1.3
No. of Samples	-	-	-	20	20	-	-	20	20	-	-	20	20

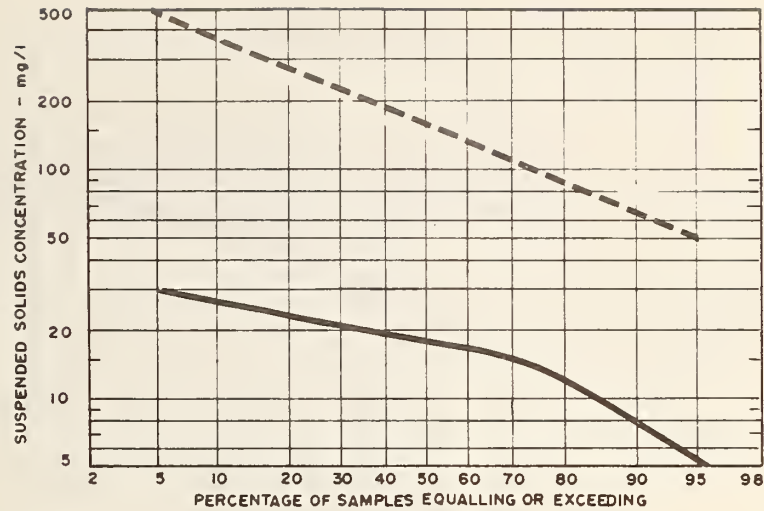
BIOCHEMICAL OXYGEN DEMAND



PLANT INFLUENT - - - - -

PLANT EFFLUENT —————

SUSPENDED SOLIDS

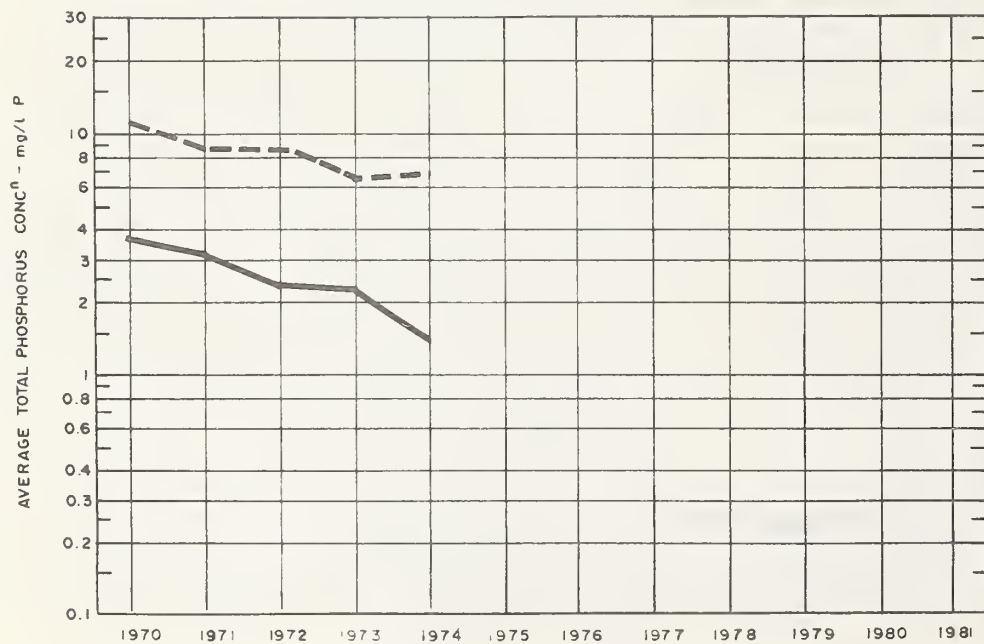
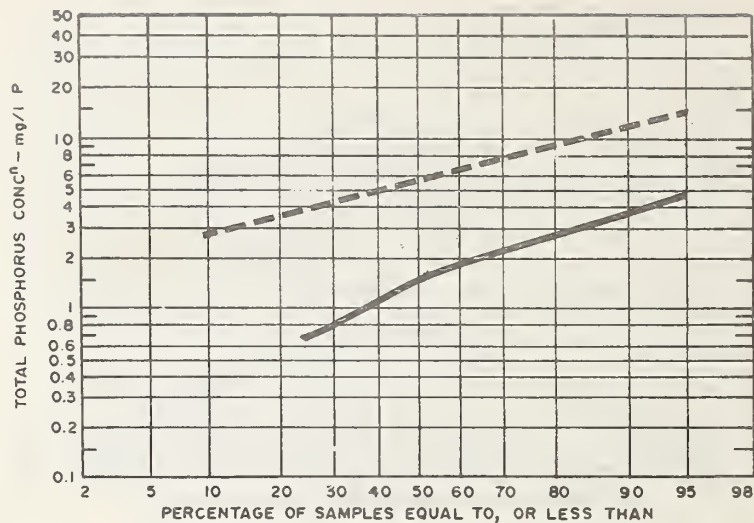


PLANT INFLUENT - - - - -

PLANT EFFLUENT _____



PHOSPHORUS



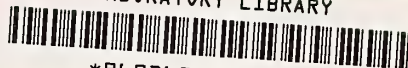
PLANT INFLUENT — — — — —
 PLANT EFFLUENT —————

TREATMENT DATA

MONTH	GRIT	CHLORINATION		AERATION			WASTE SLUDGE			AEROBIC DIGESTER			
	QUANTITY REMOVED	Cl ₂ USED	AVG. DOSAGE	MLSS CONC	F/M *	AIR USED	QUANTITY	SUSPENDED SOLIDS	VOL. SOLIDS	QUANTITY REMOVED	SUSPENDED SOLIDS	VOL. SOLIDS	AMOUNT HAULED
	cubic feet	pounds	mg/l	mg/L	day ⁻¹	$\frac{1000 \text{ ft}^3}{\text{lb BOD}}$	10^3 gallons	mg/L	%	10^3 gallons	mg/L	%	cubic yards
JAN	70			3300	.09	1.2	1.5				3400	51	
FEB	60			3400	.13	.8	4.0				6800	53	
MAR	74			2900	.16	.8	15.5				11400	66	
APR	72			2200	.07	2.2	19.5				11000	56	
MAY	84	144	1.4	2600	.14	1.1	21.0				9900	59	
JUNE	77	365	2.0	3200	.17	1.3	3.0			80	13000	55	475
JULY	86	378	2.2	3300	.03	8.3	17.0				5000	58	
AUG	142	349	2.3	3200	.25	.9	43.0				6100	49	
SEPT	78	342	2.0	3600	.08	2.6	41.5				13000	55	
OCT	89	275	1.9	4900	.04	3.3	16.0				14000	55	
NOV	53			2600	.09	2.7	12.0				13000	53	
DEC	73			3400	.06	1.9	16.0				14000	55	
TOTAL	958	1853	-	-	-	-	210.0	-	-	80	-	-	475
AVG.	4.6 cu. ft/mit gal	309	2.2	3200	.10	2.3	17.5				10100	55	

*Reaeration Tank MLSS concentration estimated to be twice Contact Tank MLSS concentration.

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